

WHAT IS CLAIMED IS:

1. A process for preparing a cold-water soluble extruded starch product that is substantially completely soluble in water at 25° C and that is film-forming in aqueous solution, the process comprising:

5 providing a hydroxyalkyl starch, said starch being derivatized with a hydroxyalkyl substituent having from 2 to 6 carbon atoms; and

10 extruding said starch in an extruder, said extruder having a barrel, a die, and at least one rotating shaft, said barrel having at least first and second zones, said first zone being upstream from said second zone, the temperature in said first zone being insufficient to gelatinize said starch and the temperature in said second zone being sufficient to gelatinize said starch, said starch being extruded in the presence of total moisture in said barrel no greater than about 25% by weight of said starch, said process including the step of controlling the rotational speed of said shaft to impart a specific mechanical 15 energy to said starch sufficient to result in a soluble extruded starch product that is capable of extrusion through said die at said rotational speed.

2. A process according to claim 1, the moisture in said barrel not exceeding 22.5% by weight of said starch.

20 3. A process according to claim 1, the moisture in said barrel not exceeding 20% by weight of said starch.

25 4. A process according to claim 1, the moisture in said barrel not exceeding 17.5% by weight of said starch.

5. A process according to claim 1, further comprising the step of drying said extruded starch product to a moisture content below about 15% to form a dried product.

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6. A process according to claim 5, said starch product being dried to a moisture content between about 9% and about 12%.

7. A process according to claim 6, further comprising the step of grinding
5 said dried product.

8. An extruded starch product prepared by a process comprising:
providing a hydroxyalkyl starch, said starch being derivatized with a
hydroxyalkyl substituent having from 2 to 6 carbon atoms; and
10 extruding said starch in an extruder, said extruder having a barrel, a
die, and at least one rotating shaft, said barrel having at least first and second
zones, said first zone being upstream from said second zone, the temperature
in said first zone being insufficient to gelatinize said starch and the
temperature in said second zone being sufficient to gelatinize said starch, said
15 starch being extruded in the presence of total moisture in said barrel no greater
than about 25% by weight of said starch, said process including the step of
controlling the rotational speed of said shaft to impart a specific mechanical
energy to said starch sufficient to result in a soluble extruded starch product
that is capable of extrusion through said die at said rotational speed, said starch
20 being substantially completely soluble in water at 25° C and being film-
forming in aqueous solution.

9. A starch according to claim 8, said starch having a moisture content
below about 15%.

25 10. A starch according to claim 8, said starch having a moisture content
ranging from about 9% to about 12%.

11. A process for preparing a solution of an extruded starch product,
30 comprising:

providing a hydroxyalkyl starch, said starch being derivatized with a hydroxyalkyl substituent having from 2 to 6 carbon atoms;

5 extruding said starch in an extruder, said extruder having a barrel, a die, and at least one rotating shaft, said barrel having at least first and second zones, said first zone being upstream from said second zone, the temperature in said first zone being insufficient to gelatinize said starch and the temperature in said second zone being sufficient to gelatinize said starch, said starch being extruded in the presence of total moisture in said barrel no greater than about 25% by weight of said starch, said process including the step of
10 controlling the rotational speed of said shaft to impart a specific mechanical energy to said starch sufficient to result in a soluble extruded starch product that is capable of extrusion through said die at said rotational speed; and
mixing said extruded starch product with water.

15 12. A process according to claim 11, the moisture in said barrel not having exceeded 22.5% by weight of said starch.

13. A process according to claim 11, the moisture in said barrel not having exceeded 20% by weight of said starch.

20 14. A process according to claim 11, the moisture in said barrel not having exceeded 17.5% by weight of said starch.

15. A process according to claim 5, said product being present in said
25 solution in an amount ranging from 1% to 40% on a dry basis.

16. A process for preparing a solution of an extruded starch product, comprising:

30 providing an extruded starch product, said product having been prepared by a process comprising:

providing a hydroxyalkyl starch, said starch being derivatized with a hydroxyalkyl substituent having from 2 to 6 carbon atoms;

extruding said starch in an extruder, said extruder having a barrel, a die, and at least one rotating shaft, said barrel having at least first and second zones, said first zone being upstream from said second zone, the temperature in said first zone being insufficient to gelatinize said starch and the temperature in said second zone being sufficient to gelatinize said starch, said starching being extruded in the presence of total moisture in said barrel no greater than about 25% by weight of said starch, said process including the step of controlling the rotational speed of said shaft to impart a specific mechanical energy to said starch sufficient to result in a soluble extruded starch product that is capable of extrusion through said die at said rotational speed; and

15 17. A process according to claim 16, the moisture in said barrel not having exceeded 22.5% by weight of said starch.

18. A process according to claim 16, the moisture in said barrel not having
20 exceeded 20% by weight of said starch.

19. A process according to claim 16, the moisture in said barrel not having exceeded 17.5% by weight of said starch.

25 20. A process according to claim 16, said product being present in solution
in an amount ranging from 1% to 40% on a dry basis.

21. The solution formed in accordance with the process of claim 20.

30 22. A process for preparing a film, comprising:

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providing a solution of an extruded starch product, said starch product having been prepared by a process comprising

providing a hydroxyalkyl starch, said starch being derivatized with a hydroxyalkyl substituent having from 2 to 6 carbon atoms; and

extruding said starch in an extruder, said extruder having a barrel, a die, and at least one rotating shaft, said barrel having at least first and second zones, said first zone being upstream from said second zone, the temperature in said first zone being insufficient to gelatinize said starch and the temperature in said second zone being sufficient to gelatinize said starch, said starch being extruded in the presence of total moisture in said barrel no greater than about 25% by weight of said starch, said process including the step of controlling the rotational speed of said shaft to impart a specific mechanical energy to said starch sufficient to result in a soluble extruded starch product that is capable of extrusion through said die at said rotational speed;

said solution having been prepared by mixing said starch product with water; and

forming a film from said solution.

20 23. A process according to claim 22, the moisture in said barrel not having exceeded 22.5% by weight of said starch.

25 24. A process according to claim 22, the moisture in said barrel not having exceeded 20% by weight of said starch.

25 25. A process according to claim 22, the moisture in said barrel not having exceeded 17.5% by weight of said starch.

30 26. A process according to claim 22, wherein said solution includes a plasticizer.

27. A film formed in accordance with the process of claim 22.

28. A process for preparing a seasoning adherence solution, comprising:
5 mixing water, an extruded starch product, and a seasoning to form a
seasoning adherence solution, said extruded starch product having been
formed by a process comprising:

10 providing a hydroxyalkyl starch, said starch being derivatized
with a hydroxyalkyl substituent having from 2 to 6 carbon atoms; and
extruding said starch in an extruder, said extruder having a
barrel, a die, and at least one rotating shaft, said barrel having at least
15 first and second zones, said first zone being upstream from said second
zone, the temperature in said first zone being insufficient to gelatinize
said starch and the temperature in said second zone being sufficient to
gelatinize said starch, said starch being extruded in the presence of
total moisture in said barrel no greater than about 25% by weight of
said starch, said process including the step of controlling the rotational
speed of said shaft to impart a specific mechanical energy to said starch
sufficient to result in a soluble extruded starch product that is capable
of extrusion through said die at said rotational speed.

20 29. A process according to claim 28, the moisture in said barrel not having
exceeded 22.5% by weight of said starch.

30 30. A process according to claim 28, the moisture in said barrel not having
25 exceeded 20% by weight of said starch.

31. A process according to claim 28, the moisture in said barrel not having
exceeded 17.5% by weight of said starch.

30 32. The seasoning adherence solution prepared in accordance with claim
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33. A process for preparing a coated food product, comprising:
providing a food substrate;
providing a seasoning adherence solution; and
5 applying said seasoning adherence to said food product in a manner effective to cause seasoning in said solution to adhere to said food substrate; said seasoning adherence solution having been prepared by mixing water, an extruded starch product, and a seasoning to form said solution, said product having been formed by a process comprising:
10 providing a hydroxyalkyl starch, said starch being derivatized with a hydroxyalkyl substituent having from 2 to 6 carbon atoms; and
extruding said starch in an extruder, said extruder having a barrel, a die, and at least one rotating shaft, said barrel having at least first and second zones, said first zone being upstream from said second zone, the temperature in said first zone being insufficient to gelatinize said starch and the temperature in said second zone being sufficient to gelatinize said starch, said starch being extruded in the presence of total moisture in said barrel no greater than about 25% by weight of said starch, said process including the step of controlling the rotational speed of said shaft to impart a specific mechanical energy to said starch sufficient to result in a soluble extruded starch product that is capable of extrusion through said die at said rotational speed.
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34. A process according to claim 33, the moisture in said barrel not having exceeded 22.5% by weight of said starch.
35. A process according to claim 33, the moisture in said barrel not having exceeded 20% by weight of said starch.
30 36. A process according to claim 33, the moisture in said barrel not having exceeded 17.5% by weight of said starch.